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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,483	07/22/2003	Andreas Hilliger	14580-020001	9125
20985	7590	08/10/2004	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			SEFER, AHMED N	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/625,483

Applicant(s)

HILLIGER ET AL.

Examiner

A. Sefer

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 11-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 2826

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group II (claims 1-10) in the reply filed on July 28, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Drawings

2. Figs. 10-13 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

Art Unit: 2826

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 1, 6 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al.

("Chen") US PG-Pub 2003/0087520.

Chen discloses (see figs. 2-5, pars. 0002-0006 and 0060) a method of forming a contact to an underlayer or region of a device or semiconductor device (as in claim 7) comprising the steps of forming a contact hole 18, forming a contact hole barrier layer 30 of a barrier material in the contact hole deposited using ALD method (as in claim 6), etching the contact hole barrier layer on the bottom surface 32 of the contact hole, depositing a liner material 40 in the contact hole and filling the contact hole with a conductive material 46.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Lee US PG-Pub 2004/0102035.

Chen discloses a method of forming a contact to an underlayer as recited in the claim, but does not disclose a contact hole barrier being formed after a wet etch step.

Lee discloses in figs. 3-6 a method of forming a contact to an underlayer or region of a device comprising the steps of forming a contact hole extending through a portion of the device including a first barrier layer 205, the method including a wet etch step, a contact hole barrier

Art Unit: 2826

layer 180 being formed after the wet etch step and filling voids in the first barrier layer caused by the wet etch step.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Lee's teachings with Chen's method of forming a contact to an underlayer since that would minimize problems associated with electro- stress-migration as taught by Lee.

As for claim 4, Chen discloses in figs. 6-11 a thickened barrier layer by application of a second contact hole barrier layer.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Kim et al. ("Kim") US PG-Pub 2002/0098682.

Chen discloses a method of forming a contact to an underlayer as recited in the claim, but does not disclose a contact hole barrier being formed before a wet etch step.

Kim discloses (par. 0032) a method of forming a contact to an underlayer or region of a device including a wet etch step; and a contact hole barrier layer formed before the wet etching step.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Kim's teachings with Chen's method of forming a contact to an underlayer since that would inhibit atomic migration as taught by Kim.

8. Claims 5 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Morozumi US PG-Pub 2003/0098466.

Chen discloses a method of forming a contact to an underlayer as recited in the claim, but does not disclose an alumina/TiO (2) barrier.

Art Unit: 2826

Morozumi discloses (see fig. 4, abstract and par. 0099) a method of forming a contact to an underlayer or region a semiconductor (as in claim 7), a passive (as in claim 8), a capacitor (as in claim 9) or an FeRam (as in claim 10) device including an alumina barrier.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Kim's teachings with Chen's method of forming a contact to an underlayer since that would shut off hydrogen as taught by Morozumi.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915.

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ANS
August 6, 2004